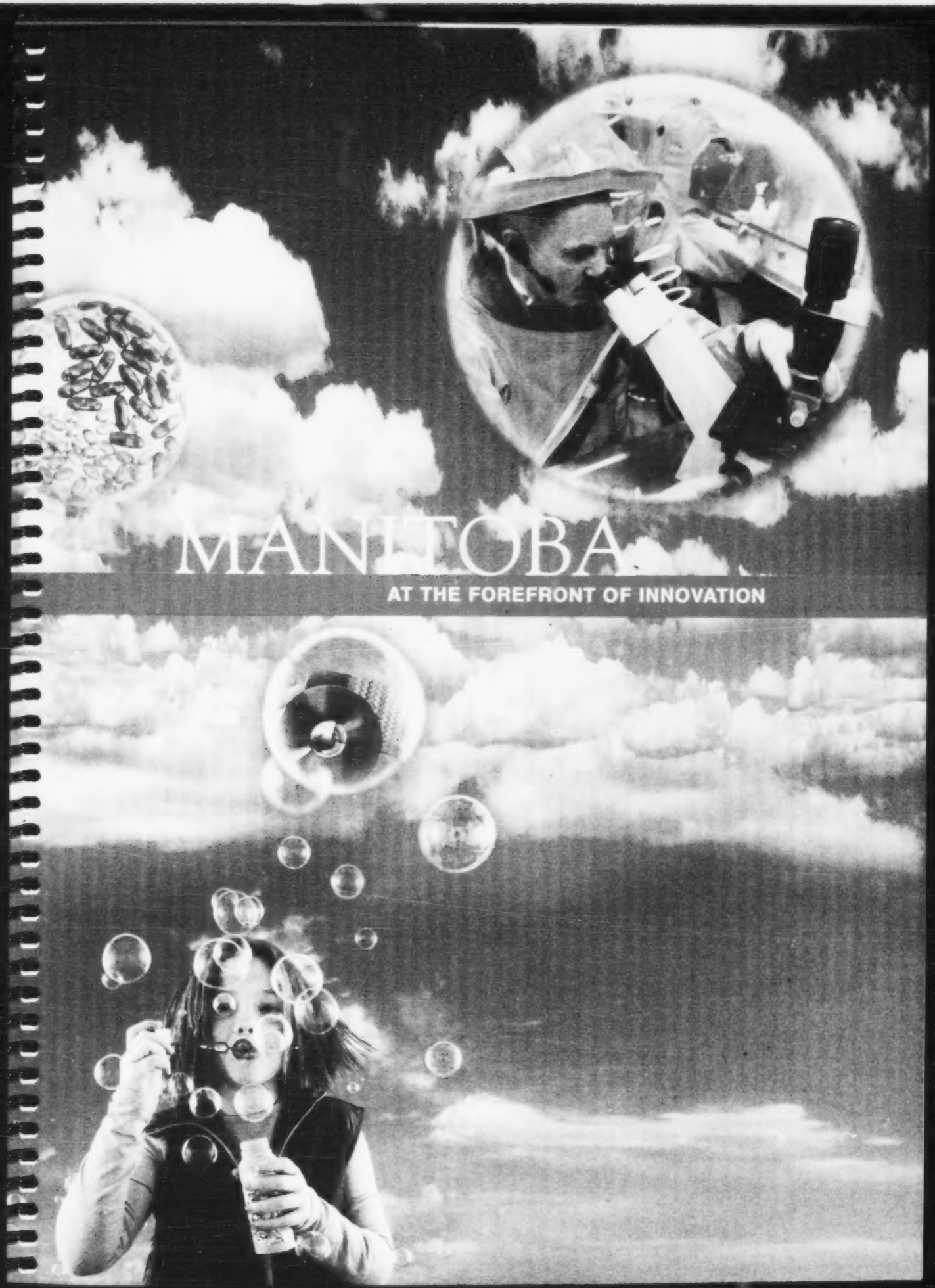
MANITOBA
AT THE FOREFRONT OF INNOVATION

INNOVATION IS THE
SUCCESSFUL DEVELOPMENT
AND APPLICATION OF KNOWLEDGE
LEADING TO THE DEVELOPMENT,
ADAPTATION OR IMPROVEMENT OF
PRODUCTS, PROCESSES, SERVICES,
MARKETS, GOVERNMENT,
INSTITUTIONS, AND IDEAS.

THE PURPOSE OF THE INNOVATION FRAMEWORK IS: TO FOSTER AN ENVIRONMENT FAVOURABLE FOR SUSTAINABLE ECONOMIC GROWTH, JOB CREATION AND QUALITY OF LIFE FOR MANITOBANS BY ENHANCING THE INNOVATIVE CAPACITY OF ALL PARTICIPANTS IN THE ECONOMY.

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MANITOBA AT THE FOREFRONT OF INNOVATION

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EXECUTIVE

INNOVATION IS THE SUCCESSFUL DEVELOPMENT AND APPLICATION OF KNOWLEDGE, WHICH LEADS TO THE DEVELOPMENT, ADAPTATION OR IMPROVEMENT OF PRODUCTS, PROCESSES, SERVICES, MARKETS, GOVERNMENTS, INSTITUTIONS AND IDEAS.

Innovation is critical to Manitoba's future economic success. It directly affects competitiveness, productivity, standards of living and quality of life. The government of Manitoba understands the importance of innovation and is creating an environment to sustain economic growth and job creation for Manitobans by expanding the innovative capacity of all participants in the economy.

Innovation thrives in systems where high levels of interaction and collaboration take place among economic and community stakeholders. At the centre of this system of innovation are people, whose interaction through networks and relationships, drive innovation activities. Effective innovation systems function at the local level and are characterized by a continuing cycle of:

- knowledge creation
- new product, process and service development
- business development, growth and attraction
- reviewing and setting new goals and challenges to create new knowledge

An Innovation Framework For Manitoba

Manitoba is moving foward with a long-term plan that will support knowledge-based economic development through innovation.

The provincial approach to innovation is based on the unique assets and strengths of our economy. The development of Manitoba's Innovation Framework is based on information gathered in consultation with business and community leaders. For example:

- Premier's Economic Advisory Council (ongoing)
- Century Summit (2000), involving Manitoba leaders from business, community and academia
- biotechnology tours to California (2001) and Germany (2002)
- Smart Tours to leading innovative countries, including Singapore (2000) and Ireland (2001)

Strategic Priorities

Manitoba is proud of its already thriving innovation and technology sector. The province is home to many leading-edge innovation businesses. The goal of our provincial strategy is to continue to build on our existing infrastructure and focus on several specific sectors. The following sectors reflect the existing and emerging strengths of our provincial economy. They also represent opportunities for tremendous growth, based on innovative local companies, world-class research and innovation infrastructure and skilled workforces.

- advanced manufacturing
- aerospace
- cultural and new media industries
- hydro and alternative energy developments
- information and communications technologies
- life sciences — biotechnology industries

Actions Already Initiated

Manitoba has already taken numerous, leadership and partnership actions to improve the innovative capacity of individuals, firms and organizations within the province. These actions are already showing a positive impact on existing innovation developments in our province and will continue to influence future developments. They form a solid foundation for our government to build upon in the future:

- the *Manitoba Training Strategy*
- the Red River College Downtown Winnipeg Campus
- a plan to double the number of information technology graduates from the University of Manitoba Computer Science Department by 2005
- a *Welcome Back Program* for expatriate Manitobans
- the *I.H. Asper Clinical Research Institute* at the St. Boniface General Hospital Research Centre
- the *Manitoba Centre for Proteomics* at the University of Manitoba
- a new five-year commitment to *TRLabs*
- activities of *Manitoba Network for Science and Technology (MindSet)*
- a cut in corporate income taxes
- *Interactive Digital Media Fund*
- *Western Life Sciences Venture Fund*
- training programs in technology commercialization
- the next generation provincial data network (PDN)
- 550 community access sites to connect the public with government services
- *Churchill Community Network* - broadband community based network
- *Canada Manitoba Business Service Centre and e-Business Service Centre*
- *At Your Service Manitoba* — improved public access to provincial government information and services
- the biotechnology strategy

MANITOBA'S INNOVATION TARGETS

With these initiatives well under way, the province is now committed to achieving new and critical innovation targets over the next several years — targets that will increase our innovative capacity and keep us focused on our provincial strategy. These targets include:

- doubling provincial research investments by 2010
- establishing the Richardson Centre for Functional Foods and Nutraceuticals, at the University of Manitoba's SMART Park by 2004
- creating a Centre of Excellence on Composite Materials in Winnipeg by 2007
- establishing two new business incubation facilities by 2005
- creating a New Media Development Centre in Winnipeg by 2007
- doubling the level of available venture capital by 2007
- creating one spin-off company for every $10 million spent on research and development
- ensuring access to broadband or high speed networks for all communities by 2010
- increasing the number of biotechnology companies by 50 per cent by 2007
- raising the number of new media and information technology companies by 25 per cent by 2007
- creating fully integrated service centres for the public's transactions with government

The measurement of success is a critical component of our Innovation Framework. Provincial targets will drive the government's approach to innovation and will be used to measure and report our progress over the next several years.

Provincial Government Six-Point Action Plan

The Manitoba government, in consultation with various communities and stakeholders, has identified six specific areas that require action. We have responded by creating a six-point action plan. These six actions are the foundation upon which Manitoba's Innovation Framework is built and are critical to its continuing success:

1. Develop a skilled workforce that meets the needs of an ever-changing economy
2. Strategically invest in research that builds on Manitoba's economic strengths
3. Strategically invest in technology commercialization activities that develop and attract opportunities
4. Connect communities to ensure that all Manitobans have the opportunity to participate in innovation activities
5. Strengthen the environment for business innovation opportunities
6. Foster a service philosophy and spirit in government that is citizen-driven, innovative and results oriented

This plan is designed to assist the government in meeting our targets. It will help us overcome existing challenges and make the most of potential opportunities to build the capacity for innovation in Manitoba. The potential for innovative development in our province is limitless. With the creation of this Innovation Framework, the provincial government is poised to tap that potential to its fullest.

TO FOSTER AN ENVIRONMENT FAVOURABLE FOR SUSTAINABLE ECONOMIC GROWTH, JOB CREATION AND QUALITY OF LIFE FOR MANITOBANS BY ENHANCING THE INNOVATIVE CAPACITY OF ALL PARTICIPANTS IN THE ECONOMY.

INTRODUCTION

High performance knowledge-based countries around the world are actively integrating innovation initiatives to increase investment, create new enterprises and open up new job opportunities. The goals of these countries' strategies are to sustain and enhance high standards of living and quality of life for their citizens.

The networks that drive innovation systems require governments to create policies that enhance and encourage links among all participants in the system. A strategic approach to innovation ensures the actions needed to support knowledge-based economic development are implemented. Innovation systems that are developed, strengthened and revitalized as a result of this approach are critical to support higher economic growth rates.

The innovation process affects science, technology, culture, economics and society. The human factor is critical to successful innovation and must influence any innovation strategy.

Increasing the innovative capacity of all participants in the economy is essential in creating economic vitality, jobs and an enhanced quality of life. Innovation is a basic element in all development. To accelerate Manitoba's economic growth, we need a clearly articulated vision for the role of innovation, science and technology.

Innovation policies must reflect the unique assets, priorities and strengths of our region. One of Manitoba's key strengths is its economic diversity. This document provides a framework for innovation activities as we move forward in an environment of increased global opportunity and competitiveness. The purpose of the Innovation Framework is:

To foster an environment favourable for sustainable economic growth, job creation and quality of life for Manitobans by enhancing the innovative capacity of all participants in the economy.

A renewed focus on innovation in Manitoba is consistent with strategic initiatives around the world as well as our local and federal governments. Manitoba is moving forward with an innovation strategy designed to build on the strengths of our industry, human resources and innovation infrastructure. Our strategy strives to ensure continuing synergies with strategies by the City of Winnipeg (*A Homegrown Economic Development Strategy*) and the federal government (*Canada's Innovation Strategy: Achieving Excellence*).

Manitoba's Innovation Framework incorporates ideas and information gathered through government-led consultations, including:

- the Premier's Economic Advisory Council (ongoing)
- the Century Summit (2000), involving Manitoba leaders from business, community and academia
- biotechnology tours to California (2001) and Germany (2002)
- Smart Tours to leading innovative countries, including Singapore (2000) and Ireland (2001)

The knowledge and competitive intelligence gained from these initiatives reinforce the need to strategically position Manitoba as a leading innovative region with the ability to meet global competitive challenges. This will ensure our economy has the capacity to sustain and enhance public health, education, social services and rising overall standards of living.

HVDC RESEARCH CENTRE

The Manitoba HVDC Research Centre, a wholly owned subsidiary of Manitoba Hydro, is the world's leader in technology for simulating high-voltage, direct-current systems, like those that carry Manitoba's clean and abundant hydroelectricity to consumers. One successful company, employing 20 engineers and technicians, has been spun off to design and market these Real Time Digital Simulation (RTDS) systems around the world. Before the RTDS was developed, it was necessary to build an elaborate model to test a power system -- now an engineer can test one on a much smaller and more flexible computer-based system.

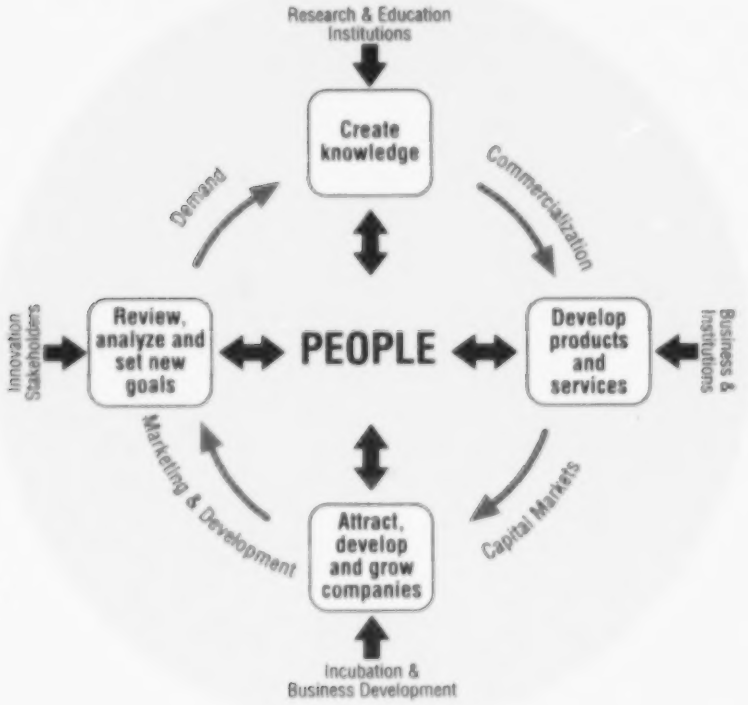


Chart 1

Why Innovation is Important

Technological change strongly influences economic growth. Investments in research and development are closely linked to rising productivity levels, which have helped improve living standards in many advanced economies. Innovative economies typically exhibit the following characteristics:

- higher rates of economic growth
- greater job growth
- higher productivity
- greater investment in people and capital
- greater capacity for the economy to attract and retain highly qualified people

In Canada, the success of many high-growth, small and medium sized enterprises (SMEs) is significantly connected to innovation. According to Statistics Canada, the following factors characterize successful small and medium-sized enterprises:

- Innovation is consistently found to be the most important characteristic associated with success.
- Innovative enterprises typically achieve stronger growth or are more successful than those that do not innovate.
- Enterprises that gain market share and increasing profitability are those that are innovative.

Innovation has become key to improved global competitiveness for many business sectors. More liberal trade and financial markets along with technological advances (particularly in information and communications technology) have reduced geographic and other trade barriers – barriers that previously protected domestic industries from international competition. The new reality for business is that local firms must continually innovate, adapt and create new products and services to compete beyond regional borders.

Manitoba's Innovation System

Innovation thrives where high levels of interaction and collaboration take place among a wide range of stakeholders within an innovation system. It is the combination of businesses, institutions, infrastructure and policies, within that system, that create the conditions for innovation to take place. Manitoba's innovation capacity is fundamental to its future prospects for economic growth, wealth creation and rising standards of living.

A system of innovation may be conceptualized as a cycle that begins with the creation of new knowledge leading to the development of new products, processes and services. These result in business development, growth and attraction to capitalize

on opportunities. As business opportunities mature, businesses, government and education and research institutions must review, analyze, reassess and set new goals based on the strengths and emerging opportunities created by the system. The cycle is complete when these new challenges and opportunities create the demand for new knowledge and ideas. (Chart 1)

A network, or an interconnected set of activities, must take place throughout the cycle to effectively drive innovation. These activities include: doing basic and applied research, developing skills, protecting intellectual property, commercializing new technologies, finding sources of risk capital, providing business incubation resources, developing markets, providing appropriate infrastructure and creating relevant government policies and regulations. Extensive interaction and feedback among all stages and activities in the innovation process are a defining characteristic of effective systems of innovation.

The acquisition of knowledge and the capacity to continually learn and adapt to rapidly changing conditions are key competitive advantages in today's global economy. Since people are the knowledge sources throughout the innovation cycle, the relationships between skilled individuals from businesses, research institutions, and marketing, finance and government organizations, are exceptionally important because they ultimately drive innovation activities in the economy.

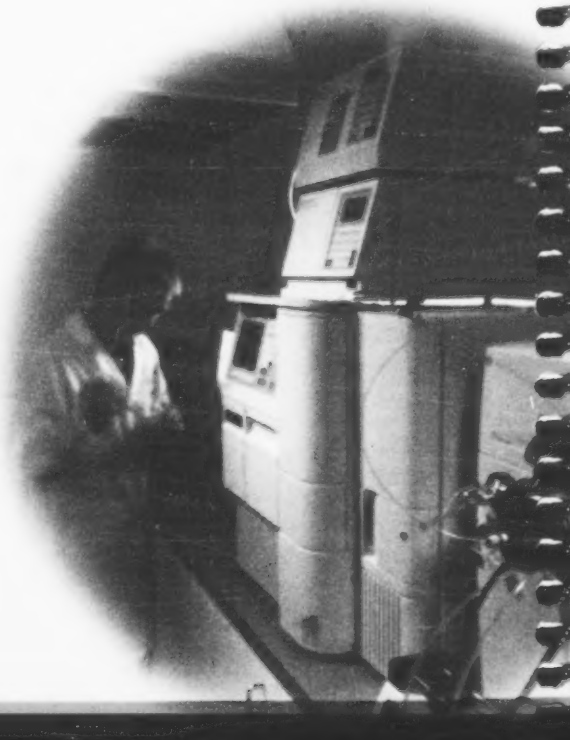
Innovation is Community-Based

Innovation takes place primarily within a local or regional context. The success of local innovation systems depends on how well community stakeholders collaborate to leverage local assets, processes and relationships that support the innovation needs of their economy.

Manitoba has outstanding innovation assets in its many science and technology-based entrepreneurs, businesses, institutions and infrastructure. The mere presence of these assets, however, does not guarantee innovation success. The intensity of innovation within a region is reflected in how well businesses, workforces, government, financial institutions, post-secondary and research institutions and innovation infrastructure interact. Interaction among these various components may be technical, commercial, legal, financial or social. The goal is to develop, protect and finance knowledge creation that results in new products, processes and services.

Innovation flourishes in environments where highly skilled workforces, entrepreneurial spirit and risk capital are strongly interwoven. Regional innovation success depends on how well communities leverage their innovation assets, processes and relationships to support the changing needs of their economies. They are intricately interwoven. Nurturing and feeding these links are essential to translate knowledge into new products, processes and services. It is also needed to create the capacity for sustained, high levels of economic growth.

The capability of businesses and entrepreneurs to connect with appropriate regional innovation assets via networks is critical. Successful regions require leadership that is committed to supporting innovation by creating, linking and strengthening innovation networks.



MANITOBA'S

TO INNOVATION

INNOVATION IS INTEGRAL TO SUCCESS IN TODAY'S KNOWLEDGE-BASED ECONOMY. ECONOMIC GROWTH AND COMPETITIVENESS DEPEND INCREASINGLY UPON THE GENERATION OF KNOWLEDGE AND THE TRANSFER OF THAT KNOWLEDGE INTO PRODUCTS, PROCESSES AND SERVICES. INNOVATION SUPPORTS ECONOMIC GROWTH AND COMPETITIVENESS BY ADVANCING KNOWLEDGE AND SKILLS THAT SUSTAIN THE INNOVATION SYSTEM, HELP SOLVE PROBLEMS AND CREATE OPPORTUNITIES.

OVERVIEW

A constant flow of information and ideas is required to build a strong economy. Government's role is to focus activities and stimulate the environment that encourages and sustains innovation. This environment includes the people, institutions, businesses, regulations and processes supporting the innovation system.

In May 2001, the Manitoba government created the Research, Innovation and Technology Division of Industry, Trade and Mines. This division was established to bring greater focus to provincial efforts in the areas of research, innovation and technology, and to take direct action to encourage and support innovation in Manitoba.

In September 2002, the Manitoba government created the new department of

Energy, Science and Technology, in response to the ever-increasing contributions of these sectors to the provincial economy and its future success. The department was formed through the combination of the following:

- Climate Change Branch — from Conservation
- Energy Development Initiative (EDI) — from Industry Trade & Mines
- Manitoba Education, Research & Learning Information Networks (MERLIN) — from Education and Youth
- Office of Information Technology (OIT) — from Finance
- Research, Innovation and Technology (RIT) — from Industry Trade & Mines
- Industrial Technology Centre — from Industry Trade & Mines
- Manitoba Health Research Council — from Health

The minister of Energy, Science and Technology is also designated as the minister responsible for Manitoba Hydro. The department will:

- focus provincial innovation activities
- assist in the growth and success of Manitoba's science, research and technology assets
- strengthen, develop, grow and attract knowledge-based industries
- focus government's information technology requirements
- build community-based partnerships through connectivity
- focus government's climate change implementation plans
- strategically develop Manitoba's energy resources, in co-operation with public and private sectors
- support innovation in communities and schools
- link response to climate change with innovation and economic success
- link government's own ICT activities with innovation and economic development

The department will work collaboratively with business, individuals, government departments and communities to strengthen their capacity to succeed, enhance the competencies they need to prosper, raise their profile locally, nationally and internationally, and foster an environment that supports sustainable economic growth.

The establishment of this new department reflects the provincial government's growing commitment to assist in developing Manitoba's science, research and technology sectors, building new partnerships in knowledge-based industries, and further developing the province's energy resources.

The provincial government also supports innovation through initiatives aimed at developing a skilled workforce that meets the human resource needs of various innovation system stakeholders. These stakeholders demand highly qualified personnel ranging from researchers and technicians to financial and legal intermediaries to marketing and management professionals. Education and training initiatives will provide innovative firms with the qualified staff they require and increase opportunities for young workers to remain in Manitoba.

Manitoba is also making strategic investments in areas such as research, innovation infrastructure and technology commercialization to ensure continued success in developing and attracting businesses in key priority sectors of the economy, including aerospace, life sciences, information and communications technology, and cultural and new media industries.

Critical in any strategic approach to innovation is the adoption of innovation within organizations and institutions. Government must understand its role in stimulating innovation, as well as the activities it must undertake within government itself to be innovative.

The provincial government's approach to innovation is to foster a government service philosophy and spirit that is citizen-driven, innovative and results-oriented. Across Manitoba, the men and women who work within government are facing tremendous challenges and exciting opportunities. The challenge for government is not only to find cost-effective ways to meet our responsibilities, but also to respond to the changing environment and needs of the community we serve.

A comprehensive and positive business environment that provides the necessary support for investment in innovation at all levels is critical to build innovation success. Manitoba's approach revolves around ensuring overall competitive cost advantages and providing the right mix of strategic tax incentives designed to provide a solid foundation for innovation developments. The Manitoba government is committed to strengthening the province's system of innovation by setting the appropriate policy environment and providing programs and services that stimulate innovative activities by the private sector.

ISIS CANADA

Enhancing and extending the useful life of our roads, bridges and other public infrastructure is an important role of ISIS (Intelligent Sensing for Innovative Structures) Canada, a national research network based at the University of Manitoba that is developing a new generation of innovative, smart structures. Researchers are finding ways to use new materials, like fibre-reinforced polymers, to strengthen structures and incorporating fibre-optics to monitor their conditions through frost, heat waves, storms and snow removal. A recent major accomplishment was developing fibre optics for the Golden Boy, so Manitobans will know how the restored provincial symbol is doing now that he's back on top of the Legislature.

INNOVATORS

INNOVATION CHALLENGES AND RECENT GOVERNMENT RESPONSES

The challenges to building Manitoba's innovation capacity have been identified through various business and community consultations. These six challenges shape the government's activities and approach to innovation in Manitoba:

1. Skilled Workforce Development

The development of a skilled workforce to meet current economic realities is the first step in the government's economic development strategy and is critical to the implementation of an innovation agenda.

Gaps in the availability of skilled science and technology workers are emerging for key Manitoba sectors such as information communications technology (ICT) and life sciences. The necessary actions to address this issue require that the province examine strategies to increase both the number and level of skilled workers in the province. For instance, innovative approaches are needed to build on the potential opportunities presented by older workers, Aboriginal youth and attraction of skilled immigrants.

At the same time, activities must also ensure that the environment is conducive to creating quality business opportunities to take advantage of skilled workforces developed in Manitoba. An innovation framework is critical to create the necessary strategies to develop, attract and grow these opportunities.

Responses to Date:

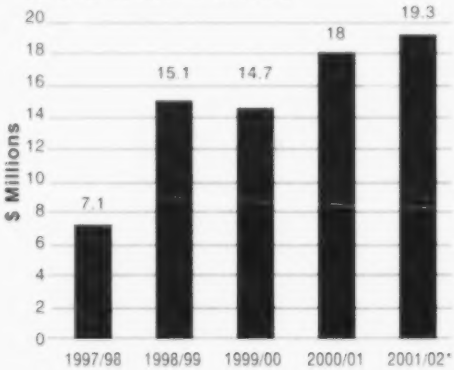
- the *Manitoba Training Strategy*
- the Red River College Downtown Winnipeg Campus
- a plan to double the number of information technology graduates from the University of Manitoba Computer Science Department by 2005
- a *Welcome Back Program* for expatriate Manitobans
- activities of the *Manitoba Network for Science and Technology (MindSet)*
- Manitoba Labour and Immigration's *Credentials Recognition Program*
- expansion of *Provincial Immigration Nominee Program* to increase the number of skilled immigrants to fill labour shortages

2. Strengthening Research Capacity

Research is imperative to meeting many of today's economic and social challenges. The creation of knowledge through basic research is the genesis for many innovation activities in the economy. Basic research is essential for knowledge creation, because it brings short-term practical dividends and provides scientific insights that may have application further down the road.

Investment in research is critical because of its strong links to innovation, productivity and economic growth. Research activities by private companies, post-secondary and research institutions and government are the main generators of new knowledge. That knowledge provides a basis for the commercialization of new products, processes and services in the marketplace.

Manitoba Government Expenditures on R&D 1997/98 – 2001/02



***Preliminary**
Source: Statistics Canada

Research also facilitates improvements in our quality of life. Advances in research promote progress in important areas such as medicine, the environment, agriculture and education. All of these improvements directly enhance our well-being.

The provincial government supports research and innovation through direct spending programs and the *Manitoba Research and Development Tax Credit*, a 15 per cent, non-refundable tax credit for qualifying R&D business expenses. Manitoba's direct spending on research includes internal departmental spending, support to business enterprises, research support to universities and health care organizations, and R&D activities at the Industrial Technology Centre.

In 2001/02, direct spending on research by the provincial government was estimated at $19.3 million, significantly higher than the $14.7 million in 1999/00. Just over half, or 51 per cent, of the provincial government's research support is for work performed by Manitoba's post-secondary institutions. A further 23 per cent of provincial research funding goes to hospitals and health organizations, including the Manitoba Health Research Council. Direct spending within government departments accounts for about 12 per cent of the research funding by the province, with the remainder carried out by business and other parties.

Basic research and its infrastructure in Manitoba are important to the local economy and need to be developed and strengthened. The level of research spending for post-secondary and research institutions remains a key indicator of Manitoba's competitiveness in retaining and attracting research investment and talented research

MANITOBA CENTRE FOR PROTEOMICS

In a branch of medical research that asks the most fundamental questions about the cells in the human body, a new Manitoba research centre is allied with a group of University of Manitoba physicists. By studying the proteins in individual cells, scientists at the Manitoba Centre for Proteomics hope to determine how viruses damage cells and why some transplant patients reject new organs. Studying proteins is tough because of their small size and large number. Enter the physicists, whose talents with the mass spectrometer – a device for measuring molecular weight – have led to a Manitoba-designed instrument being marketed by Canada's largest manufacturer of scientific instruments. Together with bio-informatics specialists, these medical scientists and physicists are pushing back the frontiers of knowledge within our own bodies.

and technology employees. Long-term stable research funds ensure a strong research infrastructure that can feed the development of new, high technology ventures in the local economy.

Responses to Date:

- the *I.H. Asper Clinical Research Institute* at the St. Boniface General Hospital Research Centre
- the *Manitoba Centre For Proteomics* at the University of Manitoba
- a new five-year commitment to TRLabs
- research facilities at post-secondary institutions have been expanded under the *Manitoba Innovations Fund and Canada Foundation for Innovation* programs
  — Research, infrastructure and equipment have been funded in such diverse areas as genomics, geology, sustainable cropping systems, broadband wireless communication, nuclear magnetic resonance, rapid prototyping systems and environmental science.

3. Effective Technology Commercialization Processes

The effective transfer of new knowledge from research can take many forms and is essential for the development of innovative societies. The commercialization of new technologies – an important method of knowledge transfer – is a vital factor in the growth of innovative firms. The technology commercialization process involves a number of critical steps including the following:

- assessing the technical and market feasibility for innovations developed through basic and applied research
- protecting intellectual property
- raising investment capital
- marketing new products, processes and services.

An effective system of technology commercialization means all relevant stakeholders (ex: businesses, investors, post-secondary and research institutions, and government) must work together to create successful initiatives. A number of commercialization challenges are being addressed as the province moves forward to fully capture its high-tech potential:

1. The development of many potential technology opportunities in Manitoba has been impeded by a lack of seed and early-stage development capital. A full range of risk capital pools, from early-stage through growth and mature stages of financing, is required for knowledge-based industries to reach their potential.

2. Access to business incubators improves the survival rates for technology startup companies. Business incubation facilities are needed to assist in identifying technologies with commercial potential and to provide management expertise for technology companies in the beginning stages of development.

3. The development of entrepreneurial skills, plus complementary business and investment management capabilities, are essential to successfully commercialize scientific discoveries and give birth to new enterprises.

Responses to Date:

- *Interactive Digital Media Fund*
- *The Western Life Sciences Venture Fund*
- *Incubat* (high tech incubator at SMART Park)
- Training programs in technology commercialization

4. Building Innovation Capacity Through Infrastructure Development

A key to building Manitoba's innovation capacity is creating appropriate infrastructure that not only develops and enhances areas of strategic importance to the economy, but also provides an opportunity for all communities and individuals to participate in innovative activities.

Access to the required levels of financial support is a significant challenge to building the necessary innovation infrastructure that will jump-start economic and social development opportunities in Manitoba communities. For this to occur, partnerships are required among different levels of government, the private sector and post-secondary institutions.

Responses to Date:

- the next generation provincial data network (PDN)
- 550 community access sites for the public to connect with government
- Churchill Community Network — a broadband community-based network

5. Ensuring a Competitive Innovation Environment

A positive environment that encourages entrepreneurial enterprise and investment is essential for innovation to flourish. As governments in Canada and other countries adopt policies to encourage greater innovation, Manitoba must ensure that our environment for business (including tax policies, regulations and programs) meet the needs of the innovation economy.

While it is important that Manitoba's business environment keeps pace with competing jurisdictions, the government must also counterbalance its activities to provide the necessary knowledge infrastructure – education and training, research funding and access to Internet connectivity – across the province.

Responses to Date:

- reductions in corporate income tax
  — Small Business Corporate Tax Rate decreased to 5 per cent (from 8 per cent)
  — increasing small business threshold for corporate income tax to $400,000 (from $200,000) by 2005
  — decreasing general corporation tax rate to 15 per cent (from 17 per cent) by 2005

6. Improving Access to Government Services

Activities in the innovation economy occur in real time. For businesses competing in the global market this means continuously reducing product-to-market timelines and a growing need for accurate, current information.

Consumers of government services, whether it is market information, financial assistance or technical support, require increasingly rapid responses from government to achieve their innovation goals. Manitoba's population varies greatly between urban, rural and northern regions. This presents a further challenge for government to provide the necessary access to services that will enhance innovation efforts for all Manitobans.

Responses to Date:

- Canada Manitoba Business Service Centre
- e-Business Service Centre
- *At Your Service Manitoba* — an initiative to improve access to provincial government information and services for Manitoba citizens

STRATEGIC PRIORITIES

In building a competitive economy, innovation must be a high priority for all economic sectors of the economy from businesses to institutions to government. The Manitoba government's approach to innovation is to stimulate innovation activities that will result in sustainable economic development and wealth creation.

In times of limited resources, a strategic approach to innovation must focus on areas with the potentially greatest return for business opportunities and economic growth. While economic diversity is the Manitoba economy's underlying strength, action on the innovation front requires a sharp focus to build upon the province's unique assets and emerging strengths.

The innovation activities highlighted in this report concentrate on six priority areas. These reflect sectors of traditional and emerging strengths in the Manitoba economy. These areas show opportunities for tremendous growth based on the existence of innovative local companies, world class research and innovation infrastructure and skilled workforces. These strategic priorities do not exclude other significant areas of economic activity in Manitoba. The goal of this innovation framework is to enhance the innovative capacity of all innovation participants and includes activities that are both targeted and more broadly based across the economy.

Current priority areas are:

- advanced manufacturing
- aerospace
- cultural and new media industries
- hydro and alternative energy development
- information and communications technologies (ICT)
- life sciences - biotechnology industries

ACSION INDUSTRIES

Acsion Industries is a privately owned Manitoba company that deploys new commercial applications using electron beam (EB) technology. Incorporated in 1998, Acsion offers customers EB processing as a method for curing advanced composite materials, sterilizing medical products, preserving food and agricultural products through bacterial decontamination, cross-linking plastics, treating waste water, and several other applications. Ascion realized its first major commerical deployment following four years of successful laboratory and field trials of EB curing to repair aircraft parts. Acetek Composites Inc. was launched in partnership with Air Canada in 2001.

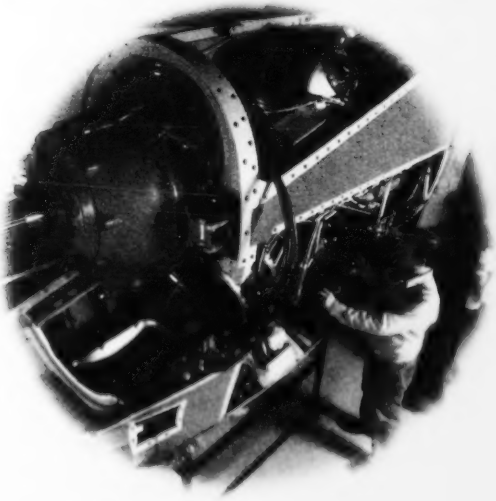
Advanced Manufacturing

Advanced manufacturing refers to the use of leading edge processes, materials, technologies and manufacturing methods to transform raw materials into marketable end products.

Manufacturing is Manitoba's largest industrial sector. It accounts for approximately 14 per cent of our GDP and directly employs about one in eight Manitobans. In total, 71,000 Manitobans are employed in the manufacturing sector. Like Manitoba's economy as a whole, the manufacturing sector is diverse. It produces a wide variety of consumer and intermediate goods. Some of these goods are well known.

Palliser Furniture, located in Winnipeg, is Canada's largest furniture factory. Winnipeg is also North America's largest centre for bus manufacturing with two major companies – Motor Coach Industries and New Flyer Industries. Maple Leaf Foods operates one of the worlds largest, most technologically advanced, meat processing plants in Brandon and Manitoba is Canada's third-largest aerospace centre, with over $1 billion in annual sales. More than 100 clothing companies make the province Canada's third largest apparel manufacturing centre.

Considerable growth in a number of other manufacturing industries has occurred over the past several years. Manitoba continues to expand in many strategically important areas, such as pharmaceuticals, biomedical equipment, nutraceuticals, electronics, chemicals and plastics. Advanced manufacturing examples range from the manufacture of composite components for the aerospace industry and the use of electron beam technology to cure composite components, to the use of Six Sigma technique (process improvement and data-driven problem solving) to improve productivity and reduce waste and costs. Advanced manufacturing covers a broad spectrum of Manitoba's manufacturing sectors.



Aerospace

Manitoba's aerospace sector is the largest in Western Canada. The province is home to a diversified range of world class manufacturing, repair, overhaul and service firms. Manufactured products include composite aircraft assemblies, advanced alloy turbine engine components and spacecraft systems. Manitoba companies specialize in repair and overhaul for turbine and reciprocating engines, and commercial passenger aircraft. Aerospace services cover a broad range from training military pilots and navigators to integrating spacecraft payloads. Manufacturing, repair and overhaul accounted for about 80 per cent of the approximately $1.2 billion in total sales generated in 2001.

Four large companies dominate Manitoba's aerospace industry. Air Canada Maintenance, Bristol Aerospace, Boeing Canada Technology and Standard Aero Limited accounted for over 90 per cent of the approximately 5,200 persons directly employed in the sector in 2001. The balance of employment is provided by approximately 17 established aerospace companies.

A growing number of small to medium-sized businesses are supplying the local aerospace sector. Included in this segment are precision machine shops, tool and die makers, precision sheet metal fabricators, plating and coating operations and electronics companies.

The aerospace industry in Manitoba is intensely export-oriented, serving hundreds of companies on every continent. The distribution of markets is typically: Canada, 20 per cent; U.S.A., 65 per cent; and the rest of the world, 15 per cent. Manitoba manufacturers supply components and sub-assemblies to all major aerospace commercial original equipment manufacturers (OEMs). Industry capabilities include, but are not limited to:

- design, development, manufacture, repair, and overhaul of composite aircraft components, turbine engines, engine components and accessories
- repair and overhaul for commercial aircraft
- repair and overhaul for rotary engines and accessories
- precision machining and precision sheet metal fabrication for high-strength metals and alloys
- fixed-wing multi-engine and rotary-wing military pilot training
- spacecraft design and integration
- sounding rocket and missile design and integration
- development of advanced strategic target systems

BRISTOL AEROSPACE LIMITED

A commitment to innovation in design and manufacture, and a dedication to quality, have propelled Bristol Aerospace to its leading position in today's highly competitive global marketplace. Qualified to ISO 9001, this Magellan aerospace company operates a 700,000 square-foot plant, aircraft hangars and composite manufacturing centre in Winnipeg, as well as Canada's only solid fuel propellant plant in Rockwood, Manitoba. Working with a wide range of materials, Bristol specializes in precision manufacturing of commercial and military aero-engine and aero-structure components, subsystems and assemblies. The company's engineering capability in high-tech manufacturing programs has proven a valuable asset for design-build teaming with manufacturers for final component design.

INNOVATORS

Cultural and New Media Industries

Technology developments are blurring the distinctions between film, sound recording, publishing and new media formats. A recent study defined new media as digitally enhanced content delivery, which has been modified through artistic talent or additional information to give the audience or user a deeper experience. Digital technology and the new media industry add a layer of possibility that makes it feasible to look at many different elements together. New media has significant crossover applications not only to entertainment, but also to publishing (including training) and health data management. As a result, there are new opportunities for partnerships between various cultural industries, to create entirely new kinds of product. Broadcast capability is also expanded by technology, from the traditional TV and radio, to high- speed Internet and high-definition TV (HDTV).

The printing/publishing component of this sector in Manitoba is the largest and most established. The sector has over 250 companies, 6,500 employees and an estimated $700 million in annual revenue. Following are leading companies in this sector.

- Friesen's Corporation is an employee-owned company based in Altona. It is Canada's largest book printer.
- Pollard Banknote is a private, Winnipeg company specializing in printing and graphic design for high quality security products including Instant Lottery Tickets, break-open/pull tab tickets and promotional games. It has four plants across North America.

The film and sound industry is also growing, with an estimated 800 employees and $85 million in revenue. The new media aspect of the sector is small, but growing rapidly in Manitoba, with 125 companies, 600 employees and an estimated $35 million in annual sales. Following are prominent companies in this sector.

- Buffalo Gal Pictures is a large Manitoba film production company based in Winnipeg. It has shown considerable growth in special documentary productions, television movies and co-productions with foreign producers.
- Frantic Films, an award-winning new media company, specializes in special effects for the film production industry. More recently, Frantic Films has moved into feature film productions and has seen its employees increase from one, five years ago, to 45 today.

Hydro and Alternative Energy Development

Manitoba is known as the hydro province, with about 95 per cent of the electricity we generate coming from clean, renewable water energy. Manitoba Hydro, headquartered in Winnipeg, serves more than 485,000 customers throughout the

FRANTIC FILMS

When the Hollywood producers of the 2001 John Travolta-Halle Berry action thriller Swordfish went looking for a mind-blowing, opening special effects sequence worth spending $5 million (US) on, they could have turned to the techno-wizards in their own backyard. Instead, they brought in the multimedia and technology artists at Winnipeg's Frantic Films. While high-tech magic has garnered fame for Frantic Films, the company has also pushed the live action envelope in three documentary series – Pioneer Quest: A Year in the Real West, Quest for the Bay, and Klondike: The Quest for Gold – pitting modern men and women against challenges from Canada's history.

province. Virtually all electricity generated by Manitoba Hydro is from self-renewing water power. Capital assets in service are more than $8 billion, making the company the fourth-largest energy utility in Canada.

Manitoba relies less on fossil fuels than much of North America. This is largely due to Manitoba Hydro's ability to offer abundant, low-cost, clean and renewable hydroelectric energy. A capacity of over 5,000 megawatts (MW) annually, encompasses 14 hydraulic generating stations, including the two Winnipeg Hydro stations and two thermal generating facilities mainly used for backup. Manitoba Hydro also has another 5,000 MW of untapped hydroelectric generation potential, for future development.

KRAUS GLOBAL INC.

Kraus Global Inc., a designer and manufacturer of transportation refueling systems, has had a number of unique clients for its world-leading equipment and software-based electronics solutions. The fastest dispensing system in Europe for CNG, and the world's first retail-style hydrogen refueling system – for environmentally friendly fuel cell cars – are among Kraus Global's achievements. The Winnipeg company is internationally renowned for its strong commitment to research and development, as demonstrated by highly skilled electronics, electrical and mechanical engineering teams and the world's largest test facility for CNG and liquefied petroleum gas.

These capabilities place Manitoba in an excellent position to build on its industrial strengths. At the same time, as demand for hydro power increases significantly in a post-carbon world, Manitoba is well placed to boost its hydro exports.

Climate change is creating new risks globally, but also offers important economic opportunities as the world moves inevitably toward cleaner energy. The recent adoption of the Kyoto Protocol by the federal government presents a number of exciting opportunities to develop industries in Manitoba that are innovative and environmentally responsible. The government is determined to make Manitoba a leader in the development of alternative energy technologies for an environmentally cleaner future. Under the Energy Development Initiative (EDI), the government and Manitoba Hydro are seeking strengthened partnerships to promote strategic development of other alternative energies such as ethanol, hydrogen and biomass. The federal government, First Nations and local industries are all potential participants. Other initiatives include solar power, geothermal energy, wind generation, along with ethanol production and use, which are expected to reduce tailpipe emissions of greenhouse gases and other environmental irritants.

Information and Communications Technologies (ICT)

The ICT sector includes manufacturing and service companies that store, manipulate and transmit information. The manufacturing side includes companies in the communications and telecommunications equipment, electronic components, computer equipment, wire and cable suppliers and instrumentation industry segments. The service side includes companies in the cable television telecommunications services, ICT wholesaling, software developers Internet companies, office equipment rentals and parts of customer contact industry segments.

In Manitoba, there are an estimated 300 ICT companies in operation. While there are large multinational ICT companies based in Manitoba, the vast majority of ICT companies are small or medium sized:

- Manitoba Telecom Services (MTS) is the leading company in the sector generating over $1 billion in revenue and employing over 3,500 in 2001.
- Another homegrown success is Vansco Electronics, which began operations as a start-up company in 1978 and now employs over 600 Manitobans. Vansco specializes in the design and manufacture of custom electronic, electro-mechanical and electro-hydraulic products.

The technical help desk sub-sector in Manitoba is a further example of a made-in-Manitoba ICT success story with nearly 1,000 employees providing technical help desk support services for ICT applications.

Manitoba offers ICT manufacturers and service providers a unique combination of competitive advantages including:

- a productive and well-educated ICT workforce available at favorable wages
- an estimated 6,600 students enrolled in ICT programs in the province in 2000/01
- an extensive network of R&D facilities supporting ICT innovation and technology diffusion
- an advanced telecommunications infrastructure with high-speed access becoming the norm, thanks to these initiatives:

— MTS's $300-million investment will bring high-speed Internet access to 85 per cent of its Manitoba locations including an additional 43 rural locations by the end of 2003.
— The rollout of the next generation provincial data network will bring broadband access to an additional 53 communities by June 2003.
— Manitoba Hydro is investing $94 million in 1,100 kilometres of 48-strand fibre optic cable infrastructure. This fibre optic superhighway will extend all the way to Gillam and will be completed by 2004, offering business-to-business services to many more remote communities in central and northern Manitoba.

VANSCO ELECTRONICS

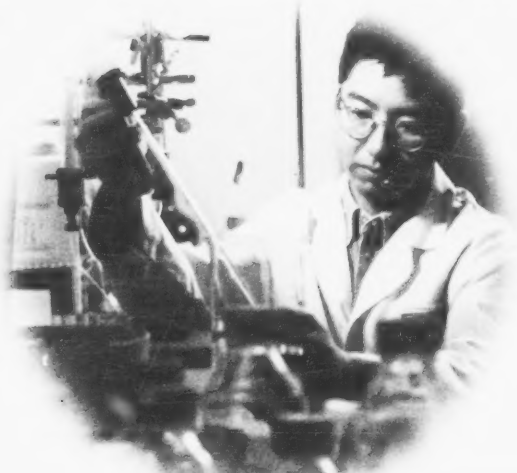
Designing and manufacturing electronic products for an age of information – producing electronic modules, instrumentation and wire harnesses for trucks, buses and heavy equipment – is the domain of Winnipeg's Vansco Electronics. Firms like Case New Holland, Caterpillar, AgChem, Volvo Construction and Motor Coach Industries look to Vansco for a way to meet their electronic needs in increasingly sophisticated equipment. Vansco's engineering staff have been granted many patents and have won international awards for their designs. The company is equally rigorous in quality control. Vansco's solutions, such as the tractor-trailer data terminal, have allowed the company to grow by an average of 30 per cent per year since 1978.

Life Sciences — Biotechnology Industries

The life sciences industry in Manitoba represents a dedicated pool of expertise in biomedical and agricultural research with an emerging environmental component. A wide range of stakeholders, including established corporations with a biotechnology division, universities, research institutes, government laboratories, venture capital firms, regulatory authorities and suppliers involved directly or indirectly in biotechnology have taken advantage of Manitoba's world-class research expertise, unique facilities and cost-effective research environment. Within this community are firms applying traditional and new biotechnology techniques to manufacture selected health and agricultural niche products. The potential for critical links between agriculture, health and environmental biotech activities has positioned Manitoba as an attractive Canadian site for life sciences research.

Manitoba's life sciences sector includes 37 biotechnology companies – 15 agricultural, 21 biomedical and one environmental. Together, they generate $200 million in annual revenue. The industry sector employs staff from various disciplines including biology, chemistry and engineering with current company employment at more than 1,600 people. Eighty-four per cent of the sector's labour force are employed by five corner-stone companies: Cangene Corporation, Biovail Corporation, Apotex Fermentation Inc., Monsanto Canada Inc. and Vita Health.

Research is a strong economic driver in the life sciences sector. The R&D infrastructure and capabilities are important to its growth and viability. Life sciences is one of the most R&D intensive sectors in Manitoba with more than $120 million spent annually. There are currently more than 1,800 research and technical staff employed within 20 research institutions supporting the life sciences sector.



CANGENE CORPORATION

Cangene Corporation is a Canadian biopharmaceutical company that is building a reputation as a world leader in developing and manufacturing medical countermeasures against critical biological infectious diseases such as Smallpox, Anthrax and other bio-terrorism agents. Cangene's innovative technology is focused on three core business lines: hyperimmunes - antibodies purified from human plasma; biopharmaceuticals – development and manufacture of multi-source biopharmaceutical (biogenerics) products; and contract manufacturing - start-to-finish manufacturing ranging from research and product development, through fermentation and purification, to final formulation, fill and finishing.

MANITOBA INNOVATION FRAMEWORK TARGETS

The measurement of success is critical to the innovation framework. Clearly defined, specific targets will drive the government's approach to innovation. They will also be used to track government's progress in improving the innovation environment in Manitoba. Provincial targets will help focus attention, measure progress, identify shortfalls and refocus activities to achieve future success.

The provincial government is confident Manitoba will reach the targets set out in this framework. The challenges Manitoba faces in enhancing our innovation environment are universal. Manitoba has numerous advantages over other regions nationally and internationally and as we build on our already strong innovation infrastructure, the targets we set will be successfully achieved.

The targets set out in this innovation framework document reflect the challenges and priorities identified through various community and industry consultations:

- doubling provincial research investments by 2010
- establishing the Richardson Centre for Functional Foods and Nutraceuticals at the University of Manitoba's SMART Park by 2004
- creating a Centre of Excellence on Composite Materials in Winnipeg by 2007
- establishing two new business incubation facilities by 2005
- creating a New Media Development Centre in Winnipeg by 2007
- doubling the level of available venture capital by 2007
- creating one spin-off company for every $10 million spent on research and development
- ensuring access to broadband or high speed networks for all communities by 2010
- increasing the number of biotechnology companies by 50 per cent by 2007
- raising the number of new media and information technology companies by 25 per cent by 2007
- creating fully integrated service centres for the public's transactions with government

PROVINCIAL GOVERNMENT SIX-POINT ACTION PLAN

Government's role in enhancing and expanding the capacity for innovation in Manitoba is to focus activities and stimulate an environment that encourages and sustains innovation. This requires individuals, institutions, businesses, regulations, policies and processes that support the innovation system. In working effectively together, these key components create an environment favourable for innovation.

The challenges identified in the review of Manitoba's innovation system create the need for a specific, six-point action plan. This plan will enable the government to effectively meet provincial targets.

ACTION # 1: Develop a skilled workforce that meets the needs of an ever-changing economy

Skilled workforces lie at the heart of a region's capacity to innovate. In the knowledge economy, a skilled workforce is not only a dynamic driver of economic growth. It is also the avenue that creates individual economic opportunity for citizens from all walks of life. The quality and level of skills in a workforce largely determine a region's ability to create and spread new knowledge throughout the economy.

Investment in skilled labour must start early as research shows significant links between early childhood development and life-long health and learning. The years from pregnancy through school entrance are enormously important. The provincial government recognizes the value of investing in early development and has provided $40 million in this area since April 2000. Priority areas include: promoting healthy pregnancy, birth and infancy, parenting and family supports, strengthening early child development, learning and care and strengthening community supports.

Investment in education and training is essential to ensure businesses and institutions have the skilled workers they need to be productive and for these workers to develop the skills they need to adapt and prosper in the rapidly changing, knowledge-based economy. In the future, economic success or failure may well depend on the ability of regions to capitalize and adapt the skills of their workforces in line with areas of emerging economic priorities.

Skilled Workforce Strategies

Manitoba Education and Youth and Manitoba Advanced Education and Training are responsible for leadership, policy and funding for Manitoba's education and training systems. They direct educating and training in both an economic and social context for present and future needs. Education is fundamental to a prosperous population and province. It is a fundamental support to scientific and economic innovation and this approach is reflected in the departments' policies and programs.

Clear evidence of the Manitoba government's commitment to education, training and developing a skilled labour pool can be seen in several important recent actions.

- Cuts in tuition fees, introduced in 2002, means tuition fees for 2002/03 will be lower than 1999 levels.

- Nearly $16 million in bursaries, scholarships and grants will be made available to post-secondary students – the largest amount in the history of Manitoba.
- A total of $24 million is being spent to increase the number of student spaces at colleges through the College Expansion Initiative.
- Tuition fee reductions, more college spaces, bursaries and partnerships with employers have already increased post-secondary enrolments by almost 19 per cent over the past three years.

Guiding Strategies

Each of the following strategies addresses particular stakeholder needs but also represent a continuum of programming in response to shifting labour market conditions and demands.

1. The Training Strategy

This strategy is based on three broad goals:

- Build a skilled workforce aligned with labour market needs and emerging opportunities.
- Enhance access to relevant learning opportunities for all Manitobans.
- Create an integrated and high quality-education and training system.

2. The College Expansion Initiative (CEI)

This strategy is revitalizing the public college system through government investment in new and expanded programs and initiatives. The investments support development of Manitoba's current and future labour market in such key sectors as aerospace and information and communications technology.

An overall commitment of $24 million for the whole province, spread equitably between the colleges, will increase student access and build capacity to develop a sustainable work force. Whether it is investments in distributed learning, tri-college programming, or community based training, one of the primary goals of CEI is to work with colleges to develop a sustainable, highly skilled, knowledge-based work force.

Every year, Manitoba invests hundreds of millions of dollars in education and training. The goal is to develop a skilled labour force that meets the rapidly changing needs of our economy. Over the past decade, federal transfer payments to the provinces for post-secondary education have been substantially reduced. According to the Canadian Consortium for Research, by 2000/01 these federal cuts led to a corresponding drop across Canada of 27 per cent (constant dollar per capita basis) in the overall level of post-secondary spending below 1992/93 levels. This drop has resulted in higher tuition fees, fewer faculty members and a decline in the nation's research capacity. Manitoba, however, has bucked this trend and is one of only two provinces that managed to increase post-secondary spending during this period, raising its per capita spending to one of the top three provinces.

A commitment to developing a skilled workforce is evident in Red River College's new Princess Street Campus. The new campus is located in the information technology (IT) corridor of the Exchange District in Winnipeg. When fully completed in 2004, the college will accommodate 2,000 students from around the province. The focus of the Princess Street Campus will be on information, communication and technology programs in response to the needs of the new economy.

Building on the province's well-established aerospace industry, CEI has committed $1.5 million to new and expanded aerospace programs. More than 84 skilled engineers and technicians graduate from this program annually.

3. Priorities for Advanced Education

Closely linked to the Training Strategy, is the Priorities for Advanced Education Strategy that guides resource and activity planning. Contained in the strategy documents are guidelines for skilled workforce development.

The strategy states five broad goals for the post-secondary system:

- Improve student success rates in all programs and institutions.
- Expand the range of students served.
- Better integrate and support knowledge and skill development based on economic and social priorities.
- Build the capacity of institutions and the community to support learning.
- Build a learning continuum (provide opportunities for lifelong learning) in the province.

4. The Kindergarten to Senior 4 Strategy

The following priorities have been identified:

- Improve outcomes especially for less successful learners.
- Strengthen links between schools, parents and communities.
- Strengthen school planning and reporting.
- Improve professional learning opportunities for educators.
- Strengthen pathways between secondary schools, post-secondary education and employment.
- Link policy and practice to research and evidence.

5. The Aboriginal Education Framework

Manitoba's Aboriginal population is younger that its non-Aboriginal population and is likely to contribute an increasing proportion of the province's labour force growth over the next few decades. Departmental activities include both the integration of Aboriginal education and training within current departmental activities and Aboriginal-focused initiatives. The framework goals are:

MINDSET

The award-winning Manitoba Network for Science and Technology (MindSet) is a public-private partnership aimed at getting the province's youth excited about science and technology careers in Manitoba. MindSet, a program of Manitoba Energy, Science and Technology, works with teachers, schools and school divisions to provide information and experiences related to science and technology areas important to the provincial economy. These include information and communications technology, biotechnology, advanced manufacturing, aerospace, new materials and agri-business. Awareness programs for teachers and students are created with the input of businesses on the cutting edge of these areas.

- Improve student success and education completion rates.
- Increase skills training and employment rates.
- Strengthen partnerships and make them more effective.

Additional Practices Supporting Innovation

The provincial government has established partnerships among government, employers, unions, sector councils, employees, students and public and private education and training institutions to achieve desired educational, economic and social results. The benefits of this approach are: enhancing the relevance and quality of education; maximizing available resources; and creating smoother transitions between school, college, university, training school and employment.

a) New Industry Training Partnerships (ITP) Branch

This branch provides integrated access and services to industry groups addressing human resource issues that affect their competitiveness and growth. Through ITP, strategic sector partnerships have been established in priority sectors: aerospace, health care products, information technology, manufacturing, tourism, garment, food processing/agribusiness, trucking, agriculture (pork production), customer contact, film and francophone film, arts and cultural industries, and environmental management. These sector-specific training initiatives are contributing to growth and innovation:

- Manitoba Aerospace Human Resources Co-ordinating Committee (MAHRCC)
- Manitoba Information Technology Industries Inc. (MITI)
- Film Training Manitoba (FTM)
- The Biotechnology Training Strategy

b) Apprenticeship Revitalization

The Apprenticeship and Trades Qualifications Act (1999) set the stage for an apprenticeship system that responds more effectively to the skills that industry requires. In this system, Provincial Trade Advisory Committees (report to the Apprenticeship and Trades Qualifications Board), represent employers and employees in determining training requirements and skills for each trade.

RED RIVER COLLEGE – PRINCESS STREET CAMPUS

Red River College's new Princess Street campus is wired so that every staff and student can plug in a laptop and every classroom has broadband access at the lecture podium. New and expanded programs will include Creative Arts, Graphic Design, Digital Multimedia Entertainment, Information Systems Technology, Communications and Network Technology and E-commerce. One of the greenest educational buildings in Canada, the Princess Street campus was assessed in the 'top five' of 36 buildings worldwide at the 2002 International Conference on Sustainable Buildings in Oslo, Norway. One thousand architects, engineers and planners from 63 countries examined the innovative work of Winnipeg's Corbett Cibinel Architects. The Manitoba government, through its $24-million College Expansion Initiative, has committed over $15 million towards the college's new campus.

c) Adult Learning Centres (ALCs)

Manitoba's 46 adult learning centres offer a variety of programs and services that promote and support lifelong learning needs for individuals and the communities they serve. Programs and services include: life skills, literacy, academic preparation, upgrading and high school preparation, pre-employment and employment skills, opportunities for post-secondary courses, career training and apprenticeship.

d) Prior Learning Assessment and Recognition (PLAR)

Manitoba's PLAR Policy Framework was released in November 2001. PLAR assesses and recognizes previous learning that has occurred in formal and informal situations. By using various assessment methods, individuals can identify and document the full range of what they know and can do. It is a powerful tool in employment, training and education. It allows individuals to reduce their training and certification time.

e) Entrepreneurship

The province is increasing its focus on entrepreneurship in mainstream programs. This includes entrepreneurship activity tailored to needs of specific industry sectors, assistance through Employment Insurance (EI) for self-employment, kindergarten to senior 4 support for Junior Achievement, and entrepreneurial skill development in youth programs.

f) Labour Market Development Agreements (LMDAs)

A partnership agreement with the federal government addresses labour market needs through the Labour Market Development Agreement (LMDA). This agreement concentrates on improving labour market success for people who have a recent connection with the workforce.

ACTION #2: Strategically invest in research that builds on Manitoba's economic strengths

The province supports research and innovation through direct spending and the Manitoba Research and Development Tax Credit.

Manitoba's direct spending on research includes internal departmental spending, support to businesses, research support to post-secondary institutions and health care organizations – Manitoba Innovation Fund, Health Research Initiative, Manitoba Health Research Council, Manitoba Centre for Health Policy Evaluation and Manitoba Centres of Excellence Fund -- and R&D activities of such facilities as the Industrial Technology Centre and Food Development Centre.

One of Manitoba's widely recognized research strengths is the fast-growing biotechnology sector. The province is home to 37 biotechnology companies. One in 10 of Canada's biotechnology companies currently do research in Manitoba. Health, environmental and agricultural biotechnology are the primary research and innovation areas, with a specific focus on cardiovascular and infectious diseases, cell biology, gene technology, nutraceuticals, proteomics, disease resistance and quality enhancement in cereal and oilseed crops. The province has 20 resident research centres and groups that do biotechnology research.

Manitoba is also home to a number of major public research and development facilities. These include: University of Manitoba, Canadian Science Centre for Human and Animal Health, the National Research Council's Institute of Biodiagnostics, Agriculture and Agri-food Canada's Cereal Research Centre, Canadian International Grains Institute, Canadian Malting Barley Technical Centre, National Centre for Agri-Food Research in Medicine, the St. Boniface General Hospital Research Centre, the Prairie Agricultural Machinery Institute and TRLabs.

While Manitoba is widely recognized for its current research facilities and programs, a number of significant new projects will further add to the province's R&D networks.

– The 110,000 square-foot St. Boniface General Hospital Research Centre is currently home to dozens of major world-class research programs, including those in the cardiovascular sciences, oncology and aging. Work is now underway on the $25 million *I.H. Asper Clinical Research Institute*, next to the St. Boniface General Hospital Research Centre. The new 100,000 square-foot research facility will help further cardiovascular care by bridg-

THE NATIONAL CENTRE FOR AGRI-FOOD RESEARCH IN MEDICINE (NCARM)

NCARM is a unique partnership between the St. Boniface General Hospital Research Centre and the faculties of medicine, agriculture and food sciences, pharmacy and human ecology at the University of Manitoba. The first research facility of its kind, the centre conducts rigorous scientific research on the health benefits of food and natural health products. NCARM scientists are currently examining the capacity of various foods and natural health products (ex: dietary flax and hemp) to alter a variety of cardiac and vascular parameters. Another interest being pursued is the effect of nutraceuticals on athletic performance.

ing research and patient care and providing the clinical resources necessary to improve cardiovascular medicines and treatments. The province of Manitoba has committed $5 million to the construction of this facility.

– The province, in partnership with the University of Manitoba, Western Economic Diversification and the private sector, is committed to establishing the $25 million state-of-the-art *Richardson Centre for Functional Foods and Nutraceuticals*, to be located in SMART Park at the University of Manitoba. About 90 researchers will do research on better extraction of the beneficial components of food, food quality and safety, packing and delivery and identifying opportunities for Manitoba products that can be processed into higher value-added foods.

– Winnipeg's reputation as a centre of excellence for medical research helped secure the new $3 million *Breast Cancer Research and Diagnostic Centre*. Supported by the federal and provincial governments in partnership with the CancerCare Manitoba Foundation, the centre will be affiliated with the Manitoba Institute for Cell Biology. The institute currently has over 100 researchers actively involved in scientific research.

The province is committed to continue expansion of new knowledge at Manitoba research institutions. The government will provide a balanced approach to creating and transferring knowledge through a range of mechanisms that support the costs of research at institutions. The government will also examine funding options that can be used to draw matching funds for projects that build upon Manitoba expertise and projects of strategic importance to the province.

At the same time, the government is committed to encourage research by Manitoba business enterprises via instruments such as the Research and Development Tax Credit. In the 2000 taxation year, $6.1 million in R&D tax credits were claimed by Manitoba corporations. The government will also endeavour to promote innovative partnerships between post-secondary research institutions and Manitoba companies that will capitalize on research synergies leading to potential commercial opportunities. Through its support for research funding to post-secondary and research institutions, participation with local venture capital funds and assistance to business incubation facilities, the government will continue to foster strategies that enhance the ability of companies to produce and use knowledge.

ACTION #3: Strategically invest in technology commercialization activities that develop and attract opportunities

A worldwide shift is taking place in the way new businesses, jobs, products and services are being created. New development patterns show that high growth, small-to-medium sized enterprises (SMEs) are typically more innovative, profitable and capable of increasing market share. The capacity to develop new products and services and bring them quickly to market is a new defining characteristic for dynamic economies that continually create highly skilled, well-paying jobs.

A well-developed capital market is essential to create and expand innovative businesses. Venture or risk capital is a major component of capital markets that involve equity investments in new and expanding companies. The capital can come from formal venture capital firms, government-supported venture funds or from investors who are often referred to as business angels. Business angels are wealthy individuals experienced in both business and finance who invest directly in businesses. While total venture capital is only a small portion of overall capital investment, it is the lifeblood for emerging innovations in the earliest stages of development.

In a fast-paced global economy, the ability to bring new technologies to market quickly is often what determines a company's success. Business incubators or accelerators have emerged over the past decade as a new type of business structure. They are designed to more effectively identify and fast track technologies with commercial potential. Survival rates are estimated to be greater for incubated companies (up to 80 per cent) versus non-incubated companies (15 per cent). Venture capitalists often favour investments in incubated early-stage companies because of the reduction in risk that results from extensive business mentoring support that is available to inexperienced managers.

Skilled employees are the foundation upon which successful innovation activity depends. Technology managers, with a good knowledge of early-stage commercialization issues and solid business experience, are scarce in Manitoba as they are in the rest of the country. Achieving technology commercialization success requires advanced skills not only for early-stage companies but also for professionals in research institutions, technology transfer offices and venture capital businesses.

A dynamic system of technology commercialization is vital for Manitoba to move ahead and fully capture its high-tech potential. The government of Manitoba recog-

INCUBAT

Two of Manitoba's most successful technology entrepreneurs have entered into a unique alliance with the University of Manitoba to nurture high-tech startups derived from university research. The strategic alliance, called Incubat, will occupy close to 10,000 square feet of a new multi-tenant facility in SMART Park, located at the University of Manitoba's Fort Garry campus. Statistics show companies that begin life in an incubator have a 70 to 80 per cent survival rate after five years, compared to 15 per cent for startups that are not developed in an incubator. Incubat hopes to work with 50 such firms over the next five years.

nizes the importance of developing a world-class system to transfer research knowledge and technology into products and services. The province will encourage and support technology commercialization initiatives in three key areas:

1. risk capital pools that meet the needs of businesses at each stage of development
2. incubation services that provide business management, mentoring and access to sources of capital for technology start-up and spin-off businesses
3. development of a skilled workforce in business management and technology commercialization

WESTERN LIFE SCIENCES VENTURE FUND

The Western Life Sciences Venture Fund (WLS), a $45-million venture capital fund, was formed in January 2002 with a mandate to invest in early-stage life science companies focused on human therapeutics and medical devices. In addition to providing capital, fund manager Lombard Life Sciences also offers a full range of corporate services to the investee companies including strategic planning, human resources, capital formation, and corporate governance and financial reporting. This level of support can significantly reduce the time it takes to get a drug or device to market. With investments in six companies as of December 2002, WLS expects to double the size of its capital pool by early 2004.

Through the effective transfer of scientific knowledge to existing businesses and the creation of new spin-off technology firms, Manitoba will strengthen its capacity to advance new economic opportunities and create wealth.

ACTION #4: Connect communities to ensure that all Manitobans have the opportunity to participate in innovation activities

The strategic use of provincial resources can drive innovation-based economic development. Infrastructure that builds innovation capacity can range from education and training facilities that provide a steady supply of skilled workers for high-tech industries, to research facilities that collaborate with industry, to Internet connectivity for rural and northern communities. The Manitoba government has made a number of important investments in infrastructure for our knowledge-based economy.

The Community Connections initiative seeks to maximize the capacity of all Manitobans to participate in online government services, online health services, online learning and the many other applications that are a part of the new knowledge-based world. The province's goal is:

To ensure all Manitobans have access to high-speed Internet, regardless of their geographical location.

This initiative is creating opportunities for all Manitobans as well as making it possible for electronic online services to become more broadly accepted and used.

Community Connections and the Broadband Project Office are helping Manitobans achieve greater access to Internet connectivity by:

- improving access to computers
- expanding access to networks
- enhancing the development of local content
- increasing access to sufficient bandwidth

Community Connections, a joint federal /provincial initiative, has created 550 new public Internet access sites throughout Manitoba bringing the total number of sites to 650. Community groups across Manitoba responded enthusiastically to opportunities for enhanced connectivity. Community Connections accommodated 110 groups beyond its initial target of 440. The 550 new sites have increased Manitoba's rank in access sites per capita from last, among the provinces to third, behind PEI and Saskatchewan.

Access site providers also participate in developing and sponsoring community home pages using web-page technology, developed through a Community Connections partnership – CIMNET (Community Information Management Network). Twelve community home pages are operating and another 12 are in development. Other community groups are beginning to use CIMNET applications and strategies to publish community information.

The extension of high-speed Internet service to rural and northern communities continues to be a serious challenge. While the majority of Manitoba's population has access to high-speed Internet, most rural and northern communities are only able to access dial-up speeds (56 kbps). In those communities where satellite services alone are available, bandwidth prices make these services prohibitively expensive. Of the four urban communities with schools, all have ADSL or cable access and only 26 of the 226 rural communities and three of the 44 northern communities with schools have ADSL or cable access. Major carriers are currently unable to make the business case needed to provide high-speed Internet to sparsely populated communities, rural or northern.

Since its creation in September, 2001, the Broadband Project Office has actively worked with the private sector and local community organizations to provide high-speed Internet/broadband solutions in various regions of the province. The office has helped northern and southern communities develop a business case and make deals to establish a community owned Internet service providers (ISP) model.

The Churchill Community Network, a high-speed connectivity project, was launched in June, 2002. It provides two megabits to both commercial and residential clients. This community-owned satellite/wireless model is the first of its kind in Manitoba.

Further investments by the Province and community groups will continue to enhance public Internet access and extend high-speed services further into rural and northern communities.

MANITOBA TELEHEALTH NETWORK

The Manitoba Telehealth Network has 24 locations across the province to give patients access to physicians through teleconferencing. Using video-conference technology, physicians from 51 clinical specialties are able to see patients or consult with other physicians. Telehealth helps minimize travel time for patients and improve access to medical education for health care providers in rural Manitoba. Technology is creating even more applications, including the use of electronic stethoscopes for cardiac and respiratory diagnosis, and teleradiology, which enables x-rays to be transferred long distance.

ACTION #5: Strengthen the environment for business innovation opportunities

Manitoba has one of Canada's most diverse and dynamic economies. It is home to a thriving mixture of major industries including aerospace, agribusiness and research, health products and research, bus manufacturing, food processing, furniture, financial services and transportation.

The diversity of the province's industrial structure provides stability to the economy. In 2000, Moody's Investor Services named Winnipeg as Canada's most diverse urban economy. While the province has many strengths, it also has balance – no single sector dominates Manitoba's economic landscape.

Manitoba's economic success is also based on its unique combination of competitive costs and taxes, a skilled, committed labour force, advanced infrastructure and an exceptional quality of life. Manitoba's business environment provides numerous advantages:

- extremely favourable business costs, including affordable office space and land costs, low construction costs and affordable taxes
- North America's lowest electricity costs through highly reliable, renewable, abundant, ecologically sound hydro power
- a well-educated, productive, multilingual labour force
- advanced, extensive electronic connectivity, including over 75,000 strand kilometers of fibre-optic cable and a high-speed, high-density broadband infrastructure
- a solid, extensive network of research and development facilities supporting innovation and technology distribution

- an excellent mid-continent location in North America's central time zone
- flexible, cost-effective transportation links and intermodal facilities providing shipping by rail, air, road and sea
- reliable, accessible public services, including quality public health care and education
- clean, uncongested communities, extensive cultural and artistic opportunities and a clean, natural environment - all of which contribute to an exceptionable quality of life

Manitoba's business environment provides a competitive cost advantage that encourages innovation and an attitude that drives economic success beyond provincial borders to world markets. In the advanced manufacturing industry, for example, Winnipeg's total costs for labour, electricity, transportation, taxes, interest and depreciation are not only substantially lower than all U.S. cities studied, but the are also lower than locations in Ontario, Vancouver and Calgary.

Manitoba's favourable business climate is more than just low costs. It's also a result of open doors and high expectations. The Manitoba government works to open doors through a variety of tax credits and streamlined approval processes for government and industry initiatives.

The province is committed to strengthening its innovation system by setting the appropriate policies and providing the programs and services to stimulate innovative activities by the private sector.

ACTION #6: Foster a service philosophy and spirit in government that is citizen-driven, innovative and results oriented

In recent years, the provincial government, like other jurisdictions, promoted 'single window' service delivery primarily through e-government strategies to improve access to services, as well as to provide support to staff through technology. This has resulted in several examples of improved back-office processes and increased satisfaction of certain stakeholder groups.

Today, however, the Manitoba government is broadening this service approach toward an overall 'citizen first' orientation. That entails focussing the delivery of all appropriate provincial public services on citizens' needs in general, for the maximum benefit of as many Manitobans as possible – as opposed to focussing on the needs of individual providers or relatively narrow internal or external client groups.

This citizen-centric service philosophy applies to all government services, but it specifically relates to those that fall within the three key citizen-and-government access channels: telephone, online and in-person contact.

FRIESENS CORPORATION

Advanced communications technology has helped Friesens Corporation become Canada's largest independent printer despite the fact that its Altona head office is far removed from most of the firm's customers. A state-of-the-art book manufacturing facility, coupled with an in-house training program, enables the Manitoba company to produce 20 million books per year -- textbooks, cookbooks, children's books, yearbooks and full-colour coffee table books -- and receive the highest honours of the Printing Industries of America.

Manitoba's goals for a citizen-centred approach to innovation and modernization in government service delivery include:

- significantly improving the ease and quality of Manitobans' access to government information, programs and services
- improving service to Manitobans through the development and implementation of cross-departmental service standards
- providing integrated service delivery through a co-ordinated strategy for key service channels such as the Internet, telephone and in-person service
- delivering more services and information to the public at times, places and in formats that are convenient for them
- ensuring there are no 'wrong doors' when the public wishes to interact with government – that employees make every reasonable effort to help citizens navigate and connect with the provincial information or services they seek
- communicating vital government information to Manitobans more effectively through a stronger integration of public information initiatives with both telephone and Internet service channels

This citizen-centred service philosophy is key to Manitoba's overall vision of modernizing government services.

Technology is an increasingly important vehicle for improving services to the public. The government of Manitoba recognizes the critical role technology can often play in ensuring modern and innovative service delivery to Manitobans. That is why, wherever possible and appropriate, the provincial government is committed to delivering e-government service solutions that meet the public need.

Advances in information and communications technology (ICT) are influencing how the public expects government services to be delivered. These changing expectations drive the evolving 'citizen first' service delivery agenda adopted by the Province of Manitoba. These same drivers have an equally profound affect on the government's ICT functions as well.

Strategically, ICT is an integral component of the provincial government's overall vision for service improvements and access to public information. The province's vision for ICT in government is:

To create an information and communication technology environment within government where appropriate technologies are fully integrated with program planning and delivery cycles.

This environment is flexible and responsive to change, open to new ideas and sup-

TRLABS

TRLabs conducts research in data networking, wireless communications, network systems and access and photonics, bridging the gap between university researchers, government and business. In 16 years, the organization's researchers have created six companies, earned 45 patents, developed 250 commercial technologies and trained 700 students. TRLabs has 34 partnerships with businesses to turn discoveries into economic growth and jobs.

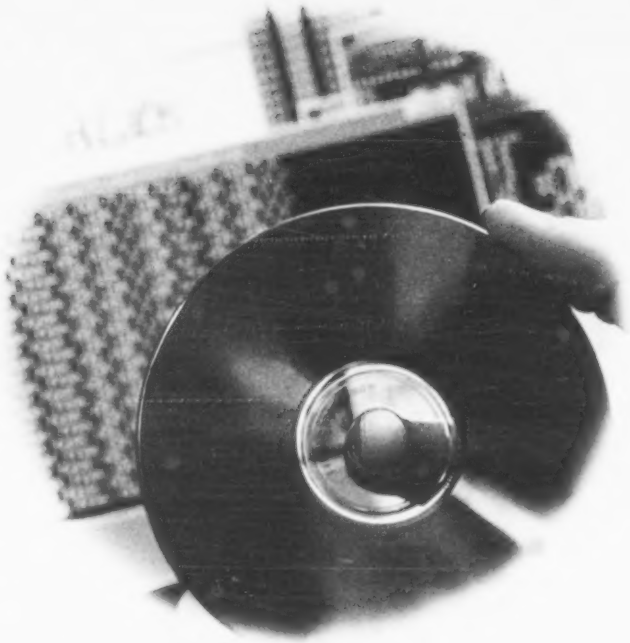
ports the government's commitment to improve services and program delivery for the direct benefit of Manitobans.

In the past, ICT in Manitoba was concentrated on improving the administrative efficiency of government processes, primarily through the automation of existing internal manual systems, with the civil service as the focus.

The role of ICT in government service today is to bring Manitoba citizens and key stakeholders, such as businesses, to the forefront - regardless of whether systems are used by an employee to deliver services or by Manitobans in a self-service capacity. To support this service progression, systems will need to be increasingly independent of specific platforms and networks. More importantly, systems will have to leverage existing ICT resources and skills in new ways to effectively meet emerging service challenges and respond to key economic opportunities for Manitoba.

The goals of Manitoba's ICT strategic direction include:

- *More Accessible Government* – the provincial government will work to meet the high expectations of its citizens and endeavor to deliver information and services that are convenient, relevant and reliable
- *Protecting Information* – the provincial government will continue to safeguard its information assets, including government ICT systems, electronic transactions and confidential information collected through all channels from Manitobans
- *Collaboration and Sharing* – the government of Manitoba will strive to reduce duplication, improve service levels and become more cost-effective for citizens through collaboration and sharing between departments and jurisdictions



The following foundational principles will guide the strategic use of ICT in the delivery of services by the government of Manitoba. ICT systems and services must:

- be designed to accommodate rapid change to government programs and services
- facilitate legitimate access to information while providing strict control over the collection, management and security of this information in accordance with appropriate access and privacy legislation, rules and guidelines
- support and encourage dialogue between citizens and government
- promote the accessibility and integration of government services by providing an enterprise view of services that crosses organizational boundaries
- align with the program planning and delivery requirements of the government
- facilitate access to government services with a goal of 'anywhere at any time'

Manitobans are facing many challenges as we engage our communities in innovation activities. Innovation is critical to Manitoba's future economic success because it directly affects our competitiveness, productivity, standard of living and quality of life.

Along with the challenges come innumerable exciting opportunities for our province. The government understands the importance of innovation and is creating an environment favourable to sustaining economic growth, job creation and high living standards for Manitobans by enhancing the innovative capacity of all participants in the economy. The government's previous actions have already positioned the province to become an innovation leader and the government believes that this innovation framework supports that goal.

By concentrating on people, who are at the centre of the innovation system, and by strengthening and enhancing the infrastructure that supports it, we can create many new stimulating opportunities for the province. We are putting Manitoba at the forefront of wealth creation - at the forefront of innovation.

MANITOBA - AT THE FOREFRONT OF INNOVATION

Web site: www.gov.mb.ca/est/

Manitoba

Building for the Future